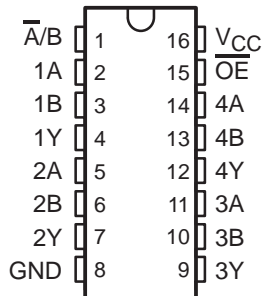


SN54HCT257, SN74HCT257 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

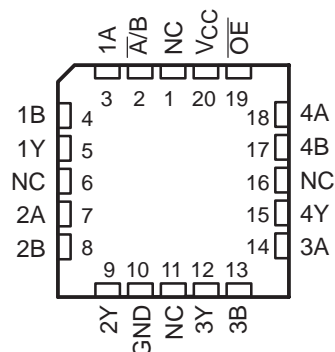
SCLS072D – NOVEMBER 1988 – REVISED SEPTEMBER 2003

- Operating Voltage Range of 4.5 V to 5.5 V
- High-Current 3-State Outputs Interface Directly With System Bus
- Typical $t_{pd} = 17$ ns
- Low Power Consumption, 80- μ A Max I_{CC}
- ± 6 -mA Output Drive at 5 V
- Low Input Current of 1 μ A Max
- Inputs Are TTL-Voltage Compatible
- Provide Bus Interface From Multiple Sources in High-Performance Systems
- Buffered Inputs and Outputs

SN54HCT257 . . . J PACKAGE
SN74HCT257 . . . D OR N PACKAGE
(TOP VIEW)



SN54HCT257 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description/ordering information

The 'HCT257 devices are designed to multiplex signals from 4-bit data sources to 4-output data lines in bus-organized systems. The 3-state outputs do not load the data lines when the output-enable (\overline{OE}) input is at the high logic level.

To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

ORDERING INFORMATION

| T_A | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|-----------|--------------|-----------------------|------------------|
| –40°C to 85°C | PDIP – N | Tube of 25 | SN74HCT257N | SN74HCT257N |
| | SOIC – D | Tube of 40 | SN74HCT257D | HCT257 |
| | | Reel of 2500 | SN74HCT257DR | |
| | | Reel of 250 | SN74HCT257DT | |
| –55°C to 125°C | CDIP – J | Tube of 25 | SNJ54HCT257J | SNJ54HCT257J |
| | LCCC – FK | Tube of 55 | SNJ54HCT257FK | SNJ54HCT257FK |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

UNLESS OTHERWISE NOTED this document contains PRODUCTION DATA information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2003, Texas Instruments Incorporated

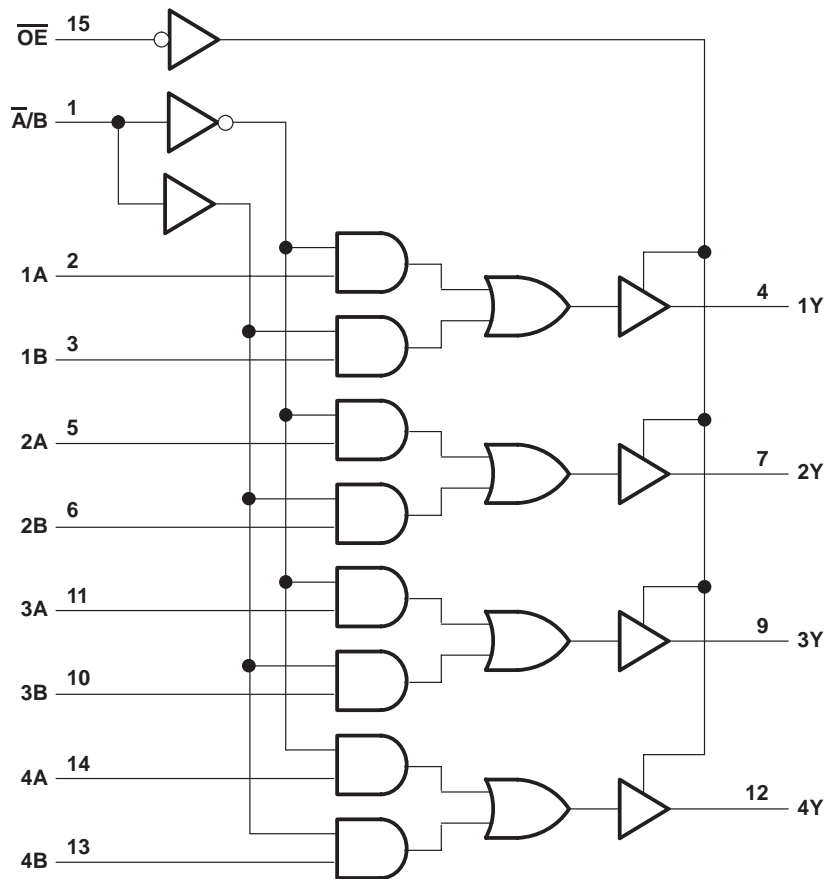
SN54HCT257, SN74HCT257 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

SCLS072D – NOVEMBER 1988 – REVISED SEPTEMBER 2003

FUNCTION TABLE

| \overline{OE} | INPUTS | | OUTPUT Y | |
|-----------------|----------------------------|------|-------------|---|
| | SELECT $\overline{A/B}$ | DATA | | |
| | | A | | B |
| H | X | X | Z | |
| L | L | L | L | |
| L | L | H | H | |
| L | H | X | L | |
| L | H | X | H | |

logic diagram (positive logic)



Pin numbers shown are for the D, J, and N packages.

SN54HCT257, SN74HCT257 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

SCLS072D – NOVEMBER 1988 – REVISED SEPTEMBER 2003

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

| | |
|-----------------------------------------------------------------------------------|----------------|
| Supply voltage range, V_{CC} | -0.5 V to 7 V |
| Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1) | ± 20 mA |
| Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1) | ± 20 mA |
| Continuous output current, I_O ($V_O = 0$ to V_{CC}) | ± 35 mA |
| Continuous current through V_{CC} or GND | ± 70 mA |
| Package thermal impedance, θ_{JA} (see Note 2): D package | 73°C/W |
| N package | 67°C/W |
| Storage temperature range, T_{stg} | -65°C to 150°C |

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 3)

| | | SN54HCT257 | | | SN74HCT257 | | | UNIT |
|----------|---------------------------------------|---------------------------|----------|-----|------------|----------|-----|------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V_{IH} | High-level input voltage | $V_{CC} = 4.5$ V to 5.5 V | | 2 | 2 | | | V |
| V_{IL} | Low-level input voltage | $V_{CC} = 4.5$ V to 5.5 V | | | 0.8 | | | V |
| V_I | Input voltage | 0 | V_{CC} | | 0 | V_{CC} | | V |
| V_O | Output voltage | 0 | V_{CC} | | 0 | V_{CC} | | V |
| t_t | Input transition (rise and fall) time | | 500 | | | 500 | | ns |
| T_A | Operating free-air temperature | -55 | 125 | | -40 | 85 | | °C |

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | V_{CC} | $T_A = 25^\circ\text{C}$ | | | SN54HCT257 | | SN74HCT257 | | UNIT |
|--------------------------|------------------------------------------------------------|----------------|----------------------------|------------|-----------|------------|------------|---------------|-----|------|
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| V_{OH} | $V_I = V_{IH}$ or V_{IL} | 4.5 V | $I_{OH} = -20 \mu\text{A}$ | | 4.4 | 4.499 | 4.4 | 4.4 | V | |
| | | | $I_{OH} = -6 \text{ mA}$ | | 3.98 | 4.3 | 3.7 | 3.84 | | |
| V_{OL} | $V_I = V_{IH}$ or V_{IL} | 4.5 V | $I_{OL} = 20 \mu\text{A}$ | | | 0.001 | 0.1 | 0.1 | V | |
| | | | $I_{OL} = 6 \text{ mA}$ | | | 0.17 | 0.26 | 0.4 | | 0.33 |
| I_I | $V_I = V_{CC}$ or 0 | 5.5 V | | ± 0.1 | ± 100 | ± 1000 | ± 1000 | nA | | |
| I_{OZ} | $V_O = V_{CC}$ or 0, $V_I = V_{IH}$ or V_{IL} | 5.5 V | | ± 0.01 | ± 0.5 | ± 10 | ± 5 | μA | | |
| I_{CC} | $V_I = V_{CC}$ or 0, $I_O = 0$ | 5.5 V | | | 8 | 160 | 80 | μA | | |
| ΔI_{CC}^\ddagger | One input at 0.5 V or 2.4 V, Other inputs at 0 or V_{CC} | 5.5 V | | 1.4 | 2.4 | 3 | 2.9 | mA | | |
| C_i | | 4.5 V to 5.5 V | | 3 | 10 | 10* | 10 | pF | | |

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

‡ This is the increase in supply current for each input that is at one of the specified TTL voltage levels, rather than 0 V or V_{CC} .

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



SN54HCT257, SN74HCT257 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

SCLS072D – NOVEMBER 1988 – REVISED SEPTEMBER 2003

switching characteristics over recommended operating free-air temperature range, $C_L = 50 \text{ pF}$ (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V_{CC} | $T_A = 25^\circ\text{C}$ | | | SN54HCT257 | | SN74HCT257 | | UNIT |
|-----------|-----------------|-------------|----------|--------------------------|-----|-----|------------|-----|------------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t_{pd} | A or B | Y | 4.5 V | | 20 | 30 | | 45 | | 38 | ns |
| | | | 5.5 V | | 17 | 27 | | 40 | | 34 | |
| | \bar{A}/B | Y | 4.5 V | | 20 | 30 | | 45 | | 38 | |
| | | | 5.5 V | | 17 | 27 | | 40 | | 34 | |
| t_{en} | \overline{OE} | Y | 4.5 V | | 20 | 30 | | 45 | | 38 | ns |
| | | | 5.5 V | | 17 | 27 | | 40 | | 34 | |
| t_{dis} | \overline{OE} | Y | 4.5 V | | 20 | 30 | | 45 | | 38 | ns |
| | | | 5.5 V | | 17 | 27 | | 40 | | 34 | |
| t_t | | Any | 4.5 V | | 8 | 15 | | 22 | | 19 | ns |
| | | | 5.5 V | | 7 | 14 | | 21 | | 17 | |

switching characteristics over recommended operating free-air temperature range, $C_L = 150 \text{ pF}$ (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V_{CC} | $T_A = 25^\circ\text{C}$ | | | SN54HCT257 | | SN74HCT257 | | UNIT |
|-----------|-----------------|-------------|----------|--------------------------|-----|-----|------------|-----|------------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t_{pd} | A or B | Y | 4.5 V | | 22 | 38 | | 57 | | 48 | ns |
| | | | 5.5 V | | 19 | 35 | | 53 | | 44 | |
| | \bar{A}/B | Y | 4.5 V | | 22 | 38 | | 57 | | 48 | |
| | | | 5.5 V | | 19 | 35 | | 53 | | 44 | |
| t_{en} | \overline{OE} | Y | 4.5 V | | 23 | 40 | | 60 | | 50 | ns |
| | | | 5.5 V | | 20 | 38 | | 57 | | 48 | |
| t_t | | Any | 4.5 V | | 17 | 42 | | 63 | | 53 | ns |
| | | | 5.5 V | | 14 | 38 | | 57 | | 48 | |

operating characteristics, $T_A = 25^\circ\text{C}$

| PARAMETER | TEST CONDITIONS | TYP | UNIT |
|----------------------------------------|-----------------|-----|------|
| C_{pd} Power dissipation capacitance | No load | 13 | pF |

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.

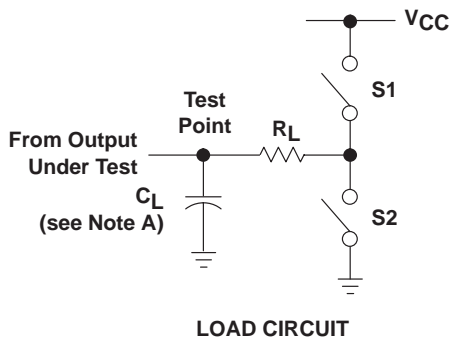


POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

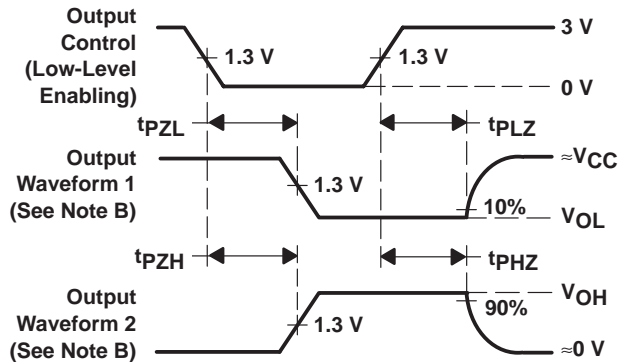
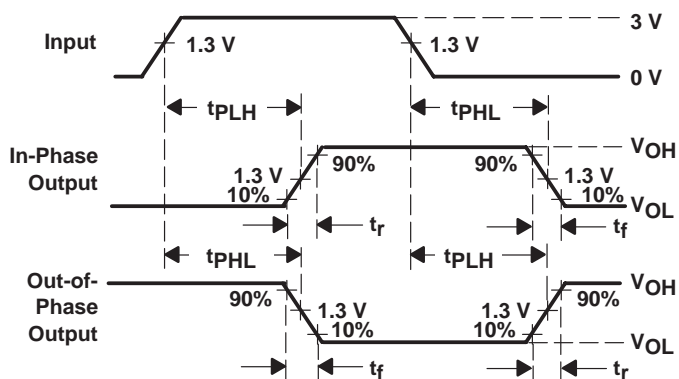
SN54HCT257, SN74HCT257 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

SCLS072D – NOVEMBER 1988 – REVISED SEPTEMBER 2003

PARAMETER MEASUREMENT INFORMATION



| PARAMETER | | R_L | C_L | S1 | S2 |
|-------------------|-----------|--------------|-----------------------|--------|--------|
| t_{en} | t_{PZH} | 1 k Ω | 50 pF or 150 pF | Open | Closed |
| | t_{PZL} | | | Closed | Open |
| t_{dis} | t_{PHZ} | 1 k Ω | 50 pF | Open | Closed |
| | t_{PLZ} | | | Closed | Open |
| t_{pd} or t_t | | -- | 50 pF or 150 pF | Open | Open |



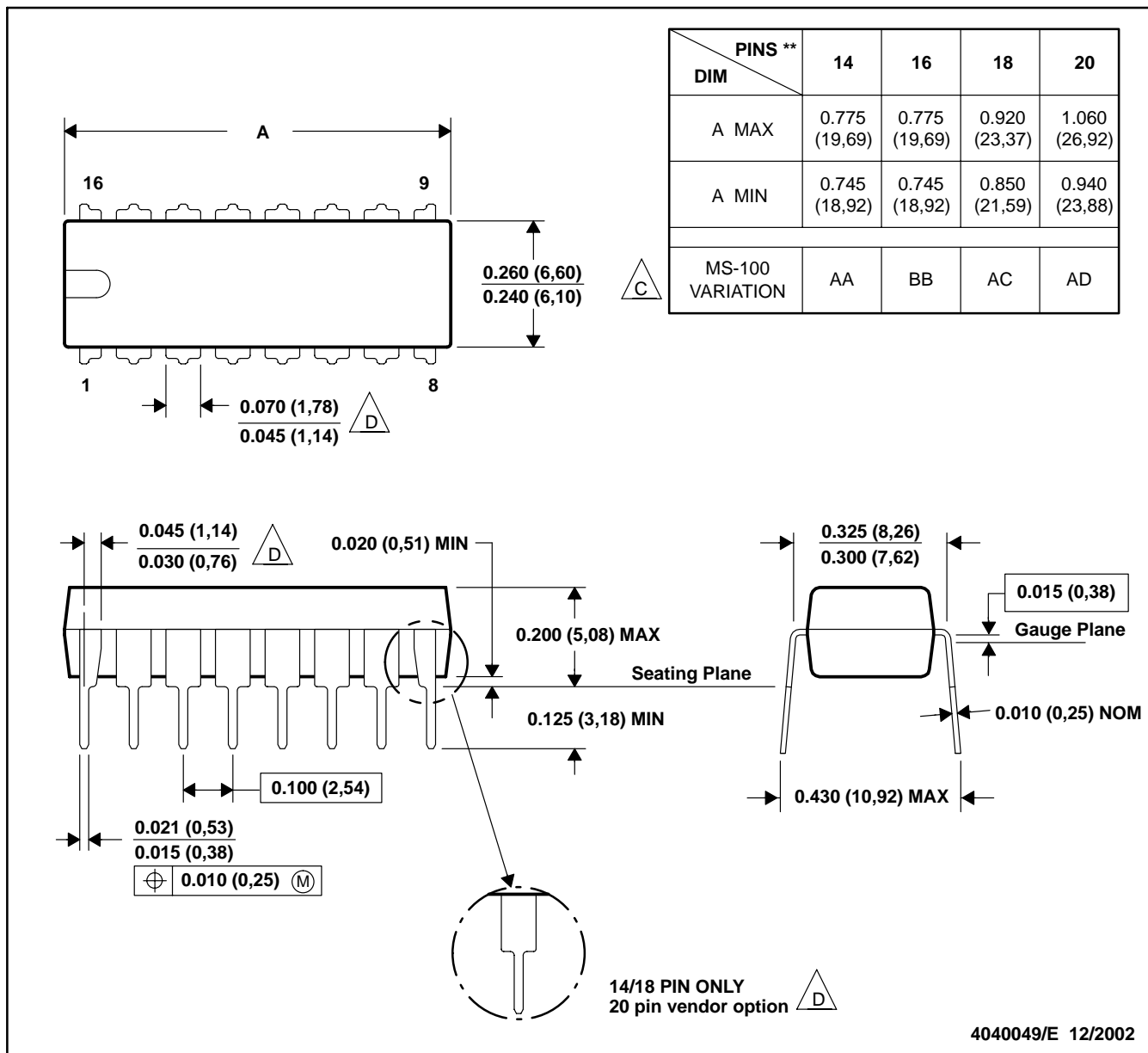
- NOTES:
- C_L includes probe and test-fixture capacitance.
 - Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 - Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, $Z_O = 50 \Omega$, $t_r = 6$ ns, $t_f = 6$ ns.
 - The outputs are measured one at a time with one input transition per measurement.
 - t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - t_{PZL} and t_{PZH} are the same as t_{en} .
 - t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



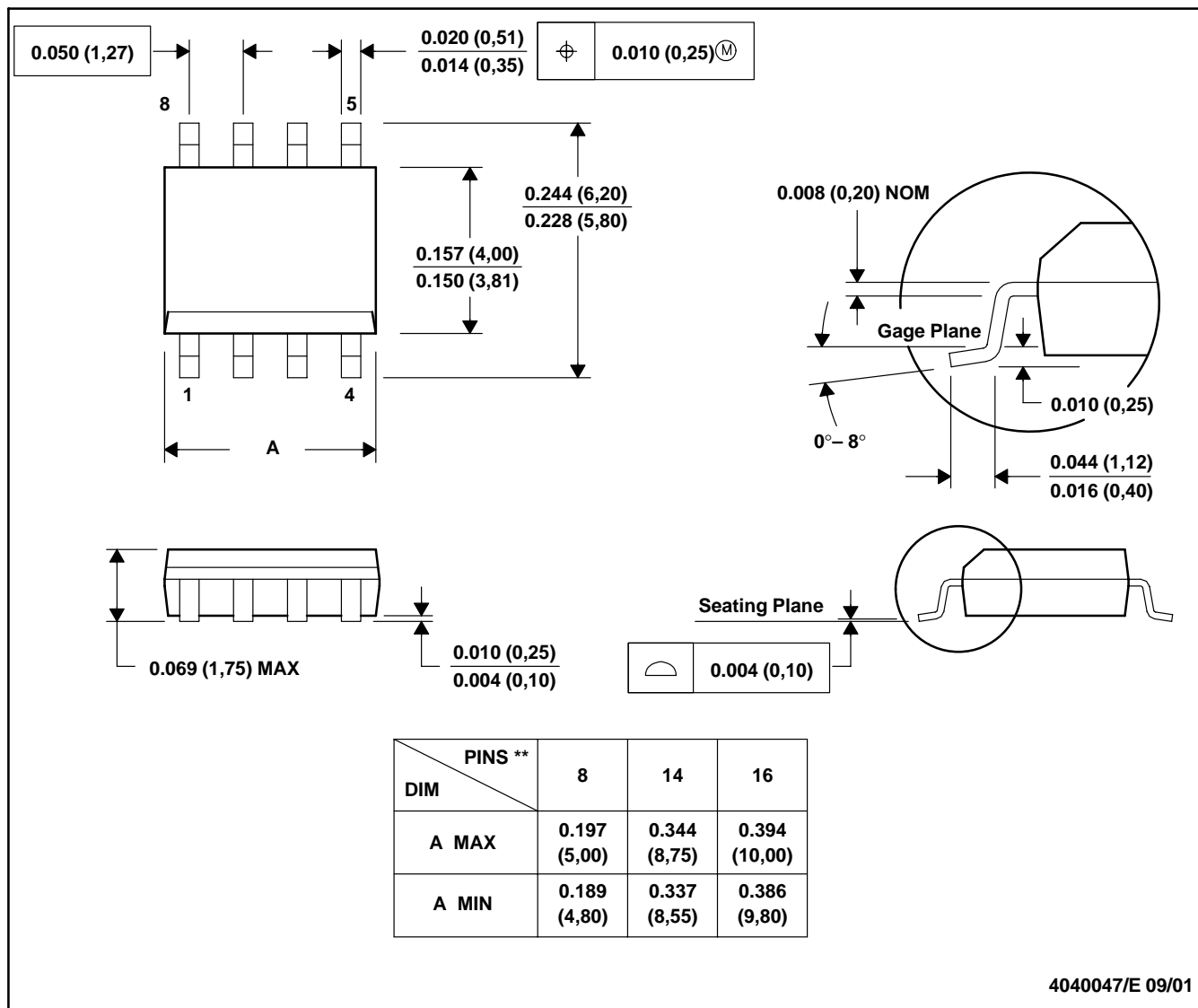
- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 D The 20 pin end lead shoulder width is a vendor option, either half or full width.

4040049/E 12/2002

D (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

8 PINS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0.006 (0,15).
 D. Falls within JEDEC MS-012

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

| Products | | Applications | |
|------------------|--------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------|
| Amplifiers | amplifier.ti.com | Audio | www.ti.com/audio |
| Data Converters | dataconverter.ti.com | Automotive | www.ti.com/automotive |
| DSP | dsp.ti.com | Broadband | www.ti.com/broadband |
| Interface | interface.ti.com | Digital Control | www.ti.com/digitalcontrol |
| Logic | logic.ti.com | Military | www.ti.com/military |
| Power Mgmt | power.ti.com | Optical Networking | www.ti.com/opticalnetwork |
| Microcontrollers | microcontroller.ti.com | Security | www.ti.com/security |
| | | Telephony | www.ti.com/telephony |
| | | Video & Imaging | www.ti.com/video |
| | | Wireless | www.ti.com/wireless |

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265

Copyright © 2003, Texas Instruments Incorporated